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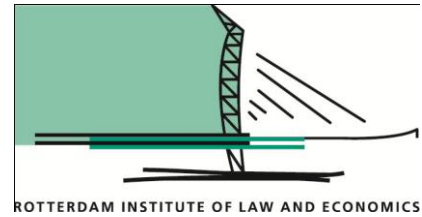


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**Time is money? A Law and Economics approach to
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Louis Visscher

Rotterdam Institute of Law and Economics
Erasmus University Rotterdam

Time is Money? A Law and Economics approach to ‘loss of time’ as non-pecuniary loss

Louis Visscher^{*}

[March 19, 2012]

‘A man who dares to waste one hour of time has not discovered the value of life’

Charles Darwin

1. Introduction

Many accidents do not only result in property losses or personal injuries, but also in what is commonly referred to as ‘a loss of time’. Breaches of contract may result in the same. A traffic accident may involve having to wait for the police to arrive and for the vehicle(s) to be removed, hospitalization and in case a legal conflict arises out of the accident, it involves spending time on adjudication. A delayed or cancelled flight may result in having to spend additional time at the airport. Part of this ‘loss of time’ may regard pecuniary losses, such as foregone income or paid interest. In this contribution, however, I will focus on the non-pecuniary aspect of ‘loss of time’ rather than on the pecuniary part. People may lose utility from the mere fact that some of their valuable time is taken by the damaging event. After all, they cannot spend this time anymore in the way they would have wanted to.

Technically speaking, people obviously do not ‘lose’ time, because they still have 24 hours in a full day and seven days in a week. The phrase ‘loss of time’ is not fully correct. The problem is rather that people lose the opportunity to spend their time in the preferred way. They are forced to spend this time in a less-preferred way, such as hanging around at the airport, lying in a hospital bed, being present at trial, et cetera. The value of time therefore is context-dependent. Still, I will use the phrase ‘loss of time’ (henceforth without quotation marks) as a shorthand notation.

In Section 2 I will sketch how non-pecuniary loss is dealt with in the economic analysis of tort law (I will focus on tort law rather than on contract law). I will discuss the so-called ‘prevention theory’ and ‘insurance theory’ of non-pecuniary loss, as well as some of the criticism that is developed regarding the latter. I will conclude this section with the viewpoint that non-pecuniary losses should be included in tort damages in order to provide potential tortfeasors with the correct behavioural incentives. In Section 3 I will spend attention to economic research regarding ‘the value of time’, as well as to the question whether people treat time and money in a similar fashion. The saying ‘time is money’ suggests that they do, but Section 3 will place some question marks in this respect. This section will show that economic research has not found a ‘one size fits all’ value of time, but rather results in complicated formulas in which many different factors play a role, many of which are of a more pecuniary nature. Given that such complicated functions are not well applicable in tort cases, in Section 4 I provide an (overly?) simplistic idea of a possible assessment of the value of lost time. In that Section, the link to the above quote from Charles Darwin will become clear. In Section 5, I will conclude.

2. The Law and Economics of non-pecuniary tort damages

2.1 Introduction

^{*} Associate professor in Law and Economics, Rotterdam Institute of Law and Economics (RILE), Erasmus Law School, Erasmus University Rotterdam.

From an economic point of view, tort law deals with the internalization of negative externalities. In the economic analysis of tort law, minimization of total accident costs is regarded as the paramount goal.¹ This implies that tort damages are not primarily intended to compensate the victim for his losses, but to provide adequate behavioural incentives for the parties involved to avoid such losses. Generally speaking, this means that tort damages should fully reflect the losses that the injurer has caused, because otherwise the tortfeasor does not receive adequate incentives.² The losses which are too expensive to avoid should be optimally spread over society. Finally, the administrative costs of the legal system should be taken into account; they should not outweigh the benefits of deterrence and loss spreading.³

2.2 Non-Pecuniary Losses

In the Law and Economics literature, the distinction between pecuniary and non-pecuniary losses is made as follows.⁴ Pecuniary losses consist of a loss of wealth or of a replaceable good. Damages can fully compensate such losses. The lost wealth is restored, the replaceable good is repaired or replaced, or the amount of damages enables such repair or replacement. The loss in utility which resulted from the pecuniary loss therefore can be fully compensated, so that the victim can be brought back to the utility position he had before the damaging event. With non-pecuniary losses, on the other hand, an irreplaceable good is damaged or destroyed, which leads to a direct loss in utility. This loss cannot be repaired and the lost utility cannot be recovered. Of course, if the victim would receive an amount of money as damages, this money would yield utility so that damages can still try to bring the victim as much as possible back into a situation comparable with before, but it will not be *the same* position. After all, the irreplaceable good is still lost, and in return the victim now has more money than before. It remains to be seen, however, if damages are really able to (fully) compensate the immaterial loss.

Cooter and Ulen spend attention to the problem of how courts should assign a money value to nonpecuniary losses. Compensation which brings the victim back to the same utility level he had before the accident, is ‘the right goal for courts trying to internalize costs, but implementing the goal is difficult for intangible, but real, harms’.⁵ This is the case because these subjective losses cannot be observed or measured, and because the money received does not make up for the immaterial loss.

The Law and Economics literature, to my knowledge, does not distinguish between different types of immaterial losses. Pain and suffering, losing an irreplaceable painting, suffering emotional loss, all these forms are treated under the general heading of non-pecuniary losses.

¹ G. CALABRESI, *The Costs of Accidents. A Legal and Economic Analysis*, 5th printing, New Haven, Yale University Press, 1977, 29. Also see, among many others, W.M. LANDES and R.A. POSNER, *The Economic Structure of Tort Law*, Cambridge, Massachusetts, Harvard University Press, 1987; S. SHAVELL, *Economic Analysis of Accident Law*, Cambridge, Massachusetts, Harvard University Press, 1987; S. SHAVELL, *Foundations of Economic Analysis of Law*, Cambridge, Massachusetts, The Belknap Press of Harvard University Press, 2004; R.D. COOTER and T.S. ULEN, *Law and Economics*, 5th ed., Boston, Massachusetts, Pearson Addison Wesley, 2008, 325ff.

² For reference to literature and a discussion of complications which warrant deviating from this general starting point, see e.g. L.T. VISSCHER, “Tort Damages”, in: M.G. FAURE, (ed.), *Tort Law and Economics. Encyclopedia of Law and Economics, Second Edition*, Cheltenham, Edward Elgar, 2009, 153-200.

³ Calabresi labels the sum of care costs and expected accident losses *primary accident costs*, the costs of having to bear the expected accident losses *secondary accident costs* and the administrative costs *tertiary accident costs*.

⁴ S. SHAVELL, *Accident Law*, 133; S. SHAVELL, *Foundations*, 242.

⁵ R.D. COOTER and T.S. ULEN, *Law and Economics*, 328.

Therefore, before switching to the topic of loss of time, I will discuss the Law and Economics approach to non-pecuniary losses in general.

2.3 The Prevention Theory

The prevention theory is rather straightforward. In order to provide the potential injurer with the correct behavioral incentives, he has to internalize the full externality he has caused. This implies that he has to compensate both pecuniary and non-pecuniary losses, because both types constitute losses to the victim. If the injurer does not face both types of losses in the expected damages, he does not fully internalize the negative externalities of his behavior, and tort law then cannot reach its preventive goal. The result would then be a too low care level and a too high activity level of the injurer and possibly the opposite for the victim.⁶ The prevention theory hence focuses on Calabresi's primary accident costs and weighs the additional costs of care measures against the resulting decrease in expected accident losses, both pecuniary and non-pecuniary.

The victim also should receive behavioural incentives and Adams argues that this is a reason *not* to compensate non-pecuniary losses. This way, the victim keeps an interest in avoiding the accident, because he will not be fully compensated.⁷ In my view, this argument undervalues the role of contributory or comparative negligence, which exactly aims at providing such incentives to the victim. Furthermore, it would result in inadequate incentives for the injurer, with all the attached problems.

2.4 The Insurance Theory

The insurance theory does not focus on the question 'what is the correct amount that the injurer should pay', but rather on the question 'what is the correct amount that the victim should receive'? Ott and Schäfer discuss the problem that non-pecuniary losses are difficult to assess. Given that these losses do not have a market value, they argue that one should determine *in an indirect* way how many resources should be spent on precautionary measures. A possible way to do this is to investigate how much money people are willing to spend on insurance against non-pecuniary losses.⁸ Compensation should only be provided for losses against which rational individuals would purchase insurance. If they would not buy insurance against immaterial losses, tort law should not force such coverage upon them.⁹

This theory compares tort law with insurance, in the sense that both systems may provide an amount of money to a victim. Especially in situations where the victim in the end is essentially the one who is paying for his own damages award, the comparison makes much

⁶ M. ADAMS, "Warum kein Ersatz von Nichtvermögensschäden?", in: C. OTT and H.-B. SCHÄFER (eds.), *Allokationseffizienz in der Rechtsordnung*, Berlin, Springer-Verlag, 1989, 213, 214; C. OTT and H.-B. SCHÄFER, "Schmerzensgeld bei Körperverletzungen. Eine ökonomische Analyse", *Juristenzeitung*, 1990, 566; J. ARLEN, "Tort Damages", in: B. BOUCKAERT and G. DE GEEST (eds.), *Encyclopedia of Law and Economics. Volume II. Civil Law and Economics*, Cheltenham, Edward Elgar, 2000, 702; S. SHAVELL, *Foundations*, 242; R.D. COOTER and T.S. ULEN, *Law and Economics*, 326ff.

⁷ M. ADAMS, *Nichtvermögensschäden*, 214.

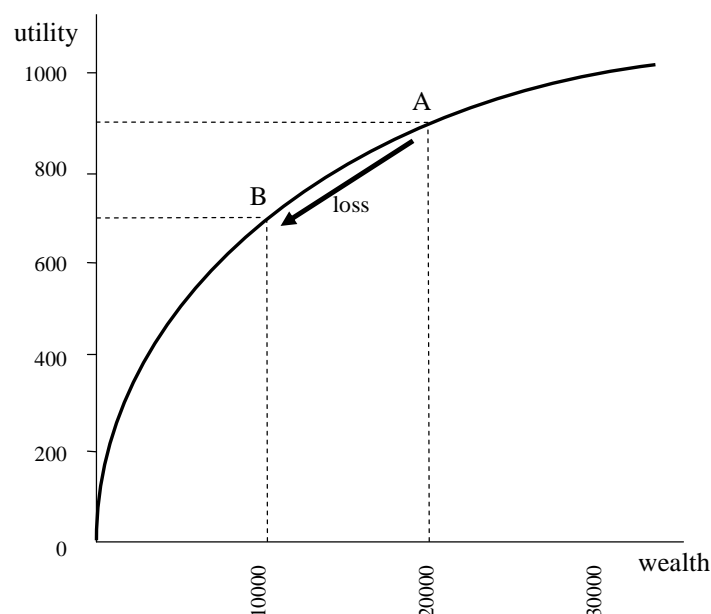
⁸ C. OTT and H.-B. SCHÄFER, *Schmerzensgeld*, 566.

⁹ S. SHAVELL, *Accident Law*, 228ff; 133; M. ADAMS, *Nichtvermögensschäden*, 216, 217; C. OTT and H.-B. SCHÄFER, *Schmerzensgeld*, 568; P.H. RUBIN and J.E. CALFEE, "Consequences of Damage Awards for Hedonic and Other Nonpecuniary Losses", *Journal of Forensic Economics*, 1992, 249ff; E.S. PRYOR, "The Tort Law Debate, Efficiency, and the Kingdom of the Ill: A Critique of the Insurance Theory of Compensation", *Virginia Law Review*, 1993, 101ff; S. SHAVELL, *Foundations*, 269ff.

sense. For example, in a situation of product liability or medical malpractice, the liable party may try to incorporate the expected liability in the price of the product or service. The greater the expected liability, the higher the price for the product or service may become. Therefore, including non-pecuniary losses in the damages makes the product or service more expensive. In this sense, potential victims, if they are also consumers of the relevant goods or services, pay a kind of ‘premium’ for the increased tort protection.

The relevant question therefore is: do rational individuals take out insurance against non-pecuniary losses? The answer of the insurance theory is ‘no’. This can most easily be explained by starting with *pecuniary* losses. A standard assumption which is made in Law and Economics is that wealth has a decreasing marginal utility. After all, an individual will spend his wealth on his needs in a decreasing order of urgency. The first Euros will be spent on things such as food, drinks, clothing and housing. Subsequent Euros will be spent on less urgent needs, so that the additional utility an additional Euro provides decreases with the level of wealth. Marginal utility of wealth remains positive. This idea is reflected in the familiar Figure 1 below. The concavity of the function expresses the decreasing marginal utility of wealth. After all, twice as large an increase in wealth results in less than twice as large an increase in utility. Figure 1 also shows a pecuniary loss of 10,000, bringing our subject from a wealth of 20,000 to a wealth of 10,000. The marginal utility of wealth is expressed by the slope of the curve and given that this slope by definition becomes steeper as we go to the left, marginal utility of wealth increases after a pecuniary loss. This implies that after the loss, money is worth more to our subject. This is regarded as an important reason why risk-averse persons (who indeed experience a decreasing marginal utility of wealth) want to take out insurance. The insurance allows them to exchange money with a low marginal utility (the insurance premium) for money with a higher marginal utility (the insurance payment after the insured event has occurred).¹⁰ Figure 1 also clearly shows that receiving an amount of money (from the insurer or from the tortfeasor in the form of damages) enables our subject to return to starting point A.

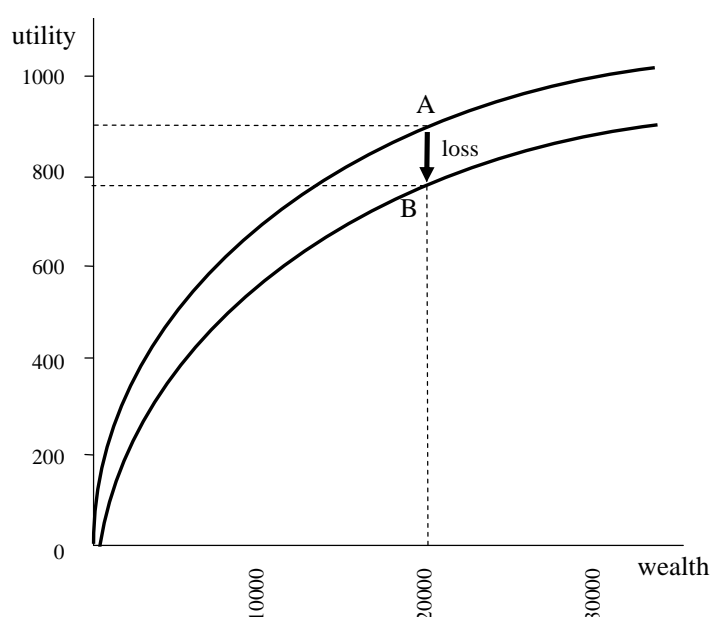
Figure 1. Decreasing marginal utility of wealth and pecuniary loss



¹⁰ See e.g. S.P. CROLEY and J.D. HANSON, “The Nonpecuniary Costs of Accidents: Pain-and-Suffering Damages in Tort Law”, *Harvard Law Review*, 1995, 1822.

With *non-pecuniary* losses, however, our subject does not lose wealth, but he losses utility in a direct way. In Figure 2 below, the utility curve of our subject shifts downward with the non-pecuniary loss. However, marginal utility of wealth does not change as a result of the non-pecuniary loss (in Section 2.5 I will return to the issue whether there are reasons to assume that marginal utility of wealth may increase due to non-pecuniary losses). This implies that our subject has no reason to insure himself against non-pecuniary losses. Such insurance would not enable him to exchange money with a low marginal utility for money with a high marginal utility. On the contrary, paying the insurance premium costs money so that marginal utility of wealth increases before the loss, and if the insured event happens and the insured receives a sum of money from the insurance, this will be money with a lower marginal utility because it has to bring him to a wealth level higher than his starting position in order to make up for the lost utility.

Figure 2. Non-pecuniary loss



Hence, if marginal utility of wealth remains the same after the non-pecuniary loss, a rational person would not self-insure against such losses and therefore, according to the insurance theory, tort law should not compensate such losses. This is indeed what the insurance theory argues.¹¹ Even more, it is sometimes argued that marginal utility of wealth will *decrease* due to the non-pecuniary loss. In a setting of personal injuries, such non-pecuniary losses (e.g. pain and suffering or decreased quality of life due to an amputation or paralysis) remove certain ways in which the victim can spend his wealth, and this likely lowers the marginal utility of wealth. After all, if the remaining activities which the victim can still undertake yield more utility, he would already have chosen those activities before the non-pecuniary loss. Therefore, such new activities either have the same or lower marginal utility than the previous activities.¹² Danzon investigates whether people take out full insurance coverage against non-pecuniary losses and whether such losses are included in compulsory public coverage. She finds that full coverage for all losses ‘far exceeds the coverage people are

¹¹ Also see P.J. COOK and D.A. GRAHAM (1977), “The Demand for Insurance and Protection: The Case of Irreplaceable Commodities”, *The Quarterly Journal of Economics*, 1977, 151, 155; H.L. FELDMAN, “Harm and Money: Against the Insurance Theory of Tort Compensation”, *Texas Law Review*, 1997, 1572ff.

¹² D.D. FRIEDMAN, “What is ‘Fair Compensation’ for Death or Injury?”, *International Review of Law and Economics*, 1982, 82.

prepared to pay for given the choice'.¹³ Empirical research suggests that injuries indeed reduce the marginal utility of wealth.¹⁴ Finally, the fact that in practice there is no demand for and supply of first party insurance against non-pecuniary losses is regarded as an additional reason to assume that rational people do not want such insurance.

2.5 Critical Appraisal of the Insurance Theory

The arguments of the insurance theory did not remain unchallenged. First, the empirical research that suggests that marginal utility of wealth decreases after suffering non-pecuniary losses due to personal injuries asks non-disabled people how they assess the impact of such losses. Given the informational problems and the inability to assess how a disability may transform one's preferences, values, desires, et cetera, it is doubtful whether non-disabled people can accurately assess the impact of such injuries on the marginal utility of money. Insights regarding adaptation suggest that this research results in an underestimation of the marginal utility, so that in fact, it may increase after suffering the non-pecuniary loss.¹⁵ Second, it is possible that a downward shift in the utility curve also influences its shape. The non-pecuniary loss lowers the so-called 'baseline utility', and this may affect marginal 'baseline-dependent utility', while marginal 'baseline-independent utility' may remain the same. Depending on the elements in the utility function, both baseline-dependent and baseline-independent, the mere downward shift of the utility curve may therefore also change its shape, slope et cetera. Therefore, it is perfectly possible that marginal utility of wealth increases after suffering the non-pecuniary loss. Rational victims may want to take out insurance against such losses, because the money received enables them to increase the baseline utility again.¹⁶ Third, the fact that there is no clear demand for such insurances may be caused by imperfect information regarding the extent of the non-pecuniary losses, the probability of their occurrence and the compensation needed, countervailing social norms in the form of societal rejection of pricing pain and sorrow and legal restrictions such as the indemnity principle.¹⁷ Fourth, on the supply side of the insurance market, adverse selection and moral hazard occur due to limited monitoring possibilities regarding non-pecuniary losses, which may prevent insurers to offer such insurance.¹⁸ Finally, the argument of the insurance theory that marginal utility either remains the same or even decreases is based on non-pecuniary losses due to personal injuries. For the topic of this paper this line of reasoning is not convincing. In cases of loss of time, it is plausible that the need for money may increase. The fact that the victim now has less time left to do the things he originally wanted to do, may result in a situation where he has to hire others to help him. For example, if a person is involved in a traffic accident during his holidays due to which he cannot return in time, he may have to take leave from his work for that period. These days cannot be used anymore to e.g. paint the house, so that he may have to hire people for this. It is not likely that this loss can be constructed as pecuniary loss resulting from the accident because the causal link may be too remote, but it is clear that the need for money increased due to the loss of time which resulted from the accident.

¹³ P.M. DANZON, "Tort Reform and the Role of Government in Private Insurance Markets", *Journal of Legal Studies*, 1984, 524. Also see S.P. CROLEY and J.D. HANSON, *Nonpecuniary Costs of Accidents*, 1801.

¹⁴ W.K. VISCUSI and W.N. EVANS, "Utility Functions That Depend on Health Status: Estimates and Economic Implications", *The American Economic Review*, 1990, 353-374.

¹⁵ E.S. PRYOR, *Kingdom of the Ill*, 116, 117.

¹⁶ S.P. CROLEY and J.D. HANSON, *Nonpecuniary Costs of Accidents*, 1815, 1827, 1834.

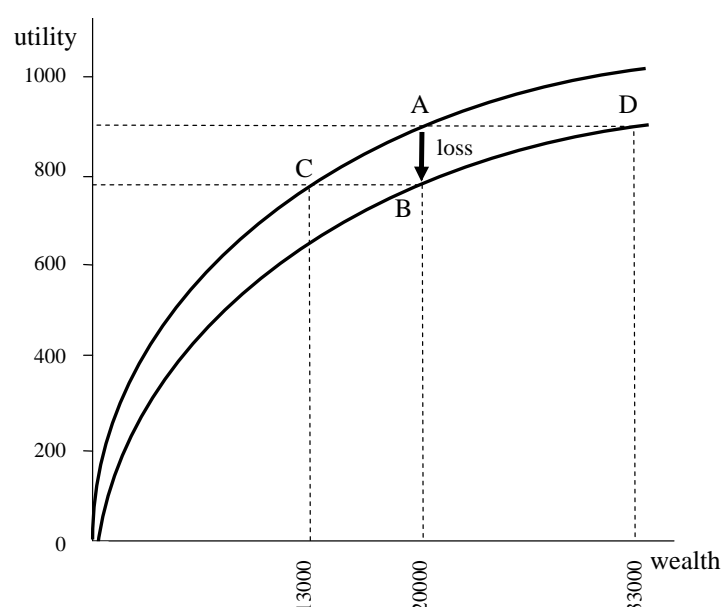
¹⁷ *Ibid.*, 1845ff.

¹⁸ R.R. BOVBJERG, F.A. SLOAN and J.F. BLUMSTEIN, "Valuing Life and Limb in Tort: Scheduling 'Pain and Suffering'", *Northwestern University Law Review*, 1989, 934.

2.6 Insurance, Ex Ante Compensation or Ex Post Compensation?

The discussion between the prevention theory and the insurance theory made clear that different views exist regarding the question whether non-pecuniary losses should be included in tort damages. Also, the statement that rational people do not want to self-insure against non-pecuniary losses was challenged. However, irrespective of this last issue, even if people would not want to self-insure, they still are willing to spend resources to lower the probability of suffering such losses. Even if such losses would not increase marginal utility of wealth of the victims, they still lower the utility for the victim. It is therefore socially desirable to include them in the weighing between costs and benefits of taking care. The fact that victims would be willing to spend resources on accident avoidance and that it is therefore desirable to provide behavioural incentives to injurers clearly shows from Figure 3.¹⁹

Figure 3: Insurance, Ex Ante Compensation and Ex Post Compensation



The non-pecuniary loss results in a downward shift of the utility curve and our victim moves from A to B. Given that the slope of the utility curve in A and B is exactly the same, according to the insurance theory there is no demand for insurance. However, before the accident happens, the victim is willing to spend an amount of wealth up to (B-C) in order to avoid the accident, because the overall level of utility in B and C is the same. Therefore, if avoidance measures would cost less than (B-C), the victim would profit from avoiding the loss, because his utility without the loss but net of his avoidance costs is higher than U_B . If a potential injurer would have to pay damages for non-pecuniary losses equal to (B-C), he would be incentivized to take the care measures which the victim found worthwhile ex ante. The *ex ante* damages in the numerical example of Figure 3 amount to €7,000. In contrast, *ex post* damages, which serve to bring the victim back to his original utility level U_A after the losses have been suffered, would amount to €13,000. A wealth of €33,000 after having suffered the non-pecuniary loss results in utility level U_D , which is identical to U_A . It is also clear that, had the non-pecuniary loss been larger, it might not have been possible to bring the

¹⁹ Also see J.E. CALFEE and P.H. RUBIN, "Some Implications of Damages Payments for Nonpecuniary Losses", *Journal of Legal Studies*, 1992, 376.

victim back to his original utility level, so that full ex post compensation then would not have been possible.

In my view, the ex ante approach forms the correct basis for determining damages for non-pecuniary losses. Because non-pecuniary losses are not losses in goods which are transferred on a market, there is no direct price mechanism to assess the losses. The resources potential victims are willing to spend to try to avoid the losses form a good alternative. By connecting to the resources victims themselves would have been willing to spend on accident avoidance, the victims are not under- or overcompensated. In addition, potential injurers are not over deterred, because they in essence bear the costs of avoidance measures which were worthwhile ex ante.

3. Some Economic Thoughts on the Value of Time

3.1 Introduction

In this Section, I will discuss economic research which is relevant for the assessment of loss of time as non-pecuniary loss. Before doing this, however, it is important to spend some words on the question how accurate this assessment should be done. Obviously, damages should not systematically deviate from social losses, because tort law then would not be able to provide correct incentives. However, a more accurate assessment is more costly, so that a trade-off exists between the costs of accurate assessment on the one hand, and the quality of the behavioural incentives on the other hand.²⁰

In this respect it is important to keep in mind that the behavioural incentives work ex ante, when the injurer does not yet know how high the losses exactly are. He will base his behaviour on an *estimation* of the average losses and therefore, a more accurate damage assessment *ex post* does not necessarily result in better incentives *ex ante*. It is important that damages are correct on average, but not necessarily in every individual case. Only if the damages systematically deviate from the social losses, the injurer will receive incorrect incentives.²¹

This implies that for the topic of loss of time, it is not necessary to exactly determine the value of time for the victim involved, as long as on average the loss is assessed correctly. If it turns out that this value is low and that the costs of assessing the loss are not negligible, it may be preferable to disregard the losses, or better to use simple tables or formulas.²² The decrease in tertiary accident costs then outweighs the increase in primary accident costs.

In the remainder of Section 3, I will spend attention to economic research regarding the value of time. This research may enable us to assess the value of time in a way which is general enough to include in the assessment of tort damages, without high assessment costs.

3.2 Economic Research Regarding the Value of Time

In 1965, Gary Becker published his *Theory of the allocation of time*, in which he argues that economic theory should not only include the prices of goods in analyzing choice behaviour,

²⁰ Hence, a trade-off between Calabresi's primary and tertiary accident costs. See G. CALABRESI, *The Costs of Accidents*.

²¹ L. KAPLOW and S. SHAVELL, "Accuracy in the Assessment of Damages", *Journal of Law and Economics*, 1996, 191-210; L. KAPLOW and S. SHAVELL, *Fairness versus Welfare*, Cambridge, Massachusetts, Harvard University Press, 2002, 265 ff.

²² S. SHAVELL, *Accident Law*, 134; S. SHAVELL, *Foundations*, 242.

but also the time that the chosen activities take to carry out.²³ The full costs of an activity do not only consist of the market price, but also of the time it takes to carry out the activity, because this time could have been used productively elsewhere. People do not only operate under a budget constraint, but also under a time constraint. The budget constraint is linked to the time constraint, because people could convert time into money by spending more time on work and less on consumption. Becker describes that households in richer countries may forfeit money income in order to obtain additional utility, e.g. by increasing their leisure time. According to him, ‘the amount of money income forfeited measures the costs of obtaining additional utility’.²⁴ Hence, Becker connects the value of leisure time to the wage rate of the person involved. This idea has been criticized, e.g. because it disregards possible constraints on the number of hours a person can work and it does not include (dis)utility from work.²⁵ DeSerpa distinguishes between two types of time constraint.²⁶ The *time resource constraint* implies that the amounts of time allocated to all activities add up to the total available time. The *time consumption constraint* reflects the fact that an individual may decide to spend more than the minimum required amount of time on a certain activity. DeSerpa also distinguishes between several ‘values of time’, which shows that there is no ‘one size fits all’ value of time. The value of *time as a resource* is the money value of an increase in available time. It is determined by the ratio between the marginal utility of time and the marginal utility of income, which of course depends also on the level of income and the wage rate. It derives its value from the fact that time is scarce. The value of *time as a commodity* is the value of the time allocated to a certain activity, which is determined by the ratio of the marginal utility of the activity and the marginal utility of money. The *value of time saving*, finally, is the willingness to pay to reduce the amount of time allocated to a certain activity, such as travel. This value is zero for activities to which the individual freely assigns more time than is necessary. DeSerpa labels such activities as leisure activities. All leisure activities must have the same marginal value (otherwise the individual would reallocate time to the activity with the larger marginal value), which equals the value of time as a resource.²⁷ Jara-Díaz *et al.* try to estimate this value of leisure empirically. It depends on, *inter alia*, the time assigned to work, the wage rate, the price and quantity of the consumed goods, the income from other sources than work and the time committed to other activities.²⁸ The authors have collected data on the relevant parameters in Karlsruhe (Germany), Santiago (Chile) and Thurgau (Switzerland). The datasets differ in the way in which they were collected and in their level of detail, which may make the comparison problematic. By studying how people in these three regions allocate their time to work, travel time, time at home, and differences between weekdays and weekend days, the authors found a value of leisure of €2.94 per hour in Santiago, €13.69 per hour in Karlsruhe and €26.06 per hour in Thurgau.²⁹ Given the fact that so many factors are relevant in these estimations, the authors state that it is not straightforward how these large differences should be interpreted.³⁰

²³ G.S. BECKER, “A Theory of the Allocation of Time”, *The Economic Journal*, 1965, 494.

²⁴ *Ibid.*, 498.

²⁵ D.M. LARSON and S.L. SHAIKH, “Recreation Demand Choices and Revealed Values of Leisure Time”, *Economic Inquiry*, 2004, 265.

²⁶ A.C. DESERPA, “A Theory of the Economics of Time”, *The Economic Journal*, 1971, 830.

²⁷ *Ibid.*, 833ff. Also see S.R. JARA-DÍAZ, M.A. MUNIZAGA, P. GREEVEN, R. GUERRA and K. AXHAUSEN, “Estimating the value of leisure from a time allocation model”, *Transportation Research Part B*, 2008, 946.

²⁸ S.R. JARA-DÍAZ *et al.*, *Value of leisure*, 950.

²⁹ *Ibid.*, 955. Unless indicated differently, all amounts in my paper are expressed in 2011 dollars, by converting the original amounts with the inflation calculator from www.bls.gov/data/inflation_calculator.htm and subsequently expressing them in Euros via the OECD purchasing power parity (http://stats.oecd.org/Index.aspx?datasetcode=SNA_TABLE4).

³⁰ *Ibid.*, 956.

Lee and Kim argue that the wage rate often is not a good proxy for the value of leisure time, different than what Becker suggested, because many people work fixed hours.³¹ Instead, they use data from a panel study in which respondents were questioned regarding their willingness to reduce working hours so that they can have more leisure. This way, they find a value of leisure of about €1.20 per hour.³²

Álvarez-Farizo *et al.* study the trade-offs between travel time to outdoor leisure activities, on-site time and money, in order to assess the value of leisure time.³³ It is important to include the travel time costs into the models estimating the value of a recreational area; otherwise this area will be undervalued. The travel time costs express how much people are willing to invest in order to go to the particular area. Many studies use, based on Becker, the wage rate as opportunity cost of time, but the authors state that this is often not realistic. If the person involved would not have travelled to area A, he probably would have spent his time on another leisure activity, rather than on work. The wage-method also is no solution for non-working or unemployed parties. And, as mentioned before, it overlooks fixed contracts and (dis)utility at work.³⁴ The authors use a survey regarding a Spanish national park. The average willingness to pay to reduce travel time for leisure purposes they find is €6.35 per hour.³⁵

Besides these studies on the value of leisure, there also exists much research regarding the value of travel time savings. This value is an important factor in evaluating whether infrastructural works, which aim at decreasing travel time, are worth their costs.³⁶ The value of travel time savings can be expressed as the value of leisure minus the money value of travel time itself.³⁷ Especially in the United Kingdom, much research has been done to assess the value of travel time, which is reviewed by Wardman in 1998.³⁸ Many factors influence this value, such as the distance, the mode of transportation, the purpose of the journey, and the type of journey (urban, suburban, inter-urban). The overall values of time found by Wardman are about €7.09 per hour for non-business travel and about €25.40 for business travel.³⁹ This large difference suggests that pecuniary considerations play an important role in the estimated value of time, while my paper is primarily interested in the non-pecuniary aspects of a loss of time. It is important to keep in mind that none of the values presented above focus on the non-pecuniary aspect, so they will all contain more or less pecuniary elements.

The above overview of economic research made clear that the value of time is a complicated concept. One cannot simply use the wage rate as an approximation for the value of time, as one might initially be inclined to do. Many factors influence the valuation of time, and the empirical estimations widely differ. In my view it is not well possible to include all the relevant parameters in a tort claim in which the victim, besides damages for property loss, personal injuries *et cetera*, also requests damages for loss of time as non-pecuniary loss,

³¹ K. LEE and I.-M. KIM, "Estimating the value of leisure time in Korea", *Applied Economics Letters*, 2005, 639.

³² *Ibid.*, 641.

³³ B. ÁLVAREZ-FARIZO, N. HANLEY and R. BARBERÁN, "The Value of Leisure Time: A Contingent Rating Approach", *Journal of Environmental Planning and Management*, 2001, 682.

³⁴ *Ibid.*, 683.

³⁵ *Ibid.*, 691.

³⁶ See e.g. P.J. MACKIE, S. JARA-DÍAZ and A.S. FOWKES, "The value of travel time savings in evaluation", *Transport Research Part E*, 2001, 91.

³⁷ *Ibid.*, 94.

³⁸ M. WARDMAN, "The Value of Travel Time. A Review of British Evidence", *Journal of Transport Economics and Policy*, 1998, 285-316.

³⁹ *Ibid.*, 295, 296. The original UK amounts are corrected for inflation via www.bankofengland.co.uk/education/Pages/inflation/calculator/flash/default.aspx and subsequently expressed in Euros.

because this would be too complicated and would therefore involve too high tertiary costs. Given the remarks on accuracy, it would be better to find a simpler way to assess such losses. In Section 4 I will propose a (too?) simple way of thinking about the possible size of such losses. But first, I will discuss interesting literature which suggests that people may not (always) treat time and money in a similar fashion.

3.3 Time is Money?

It is well known that many people fall prey to the *sunk cost effect*. They pay attention to non-recoverable past costs in deciding their current actions and may be willing to invest additional money, simply because they have already spent money on it earlier. Economically speaking, such past costs should be irrelevant, because decisions should be taken on the basis of current (and possibly future) marginal costs and benefits. Thaler argues that the sunk cost effect can be understood with the concept of ‘mental accounting’.⁴⁰ If a person *e.g.* buys a concert ticket well in advance of the concert, he has ‘opened a mental account’, which now has a deficit. If the person attends the concert, the account will be balanced and closed. If the person cannot attend the concert, the account will be closed at a loss. To avoid this loss, the person is willing to spend additional resources (in an example of Thaler: to drive through a blizzard) so that the mental account can be closed without a loss.

Soman hypothesizes that the sunk cost effect may not play a similar role if the investment took place in time rather than in money, because (1) time cannot be inventoried or replaced, (2) it is not as easily aggregated as money and (3) accounting for time is not a routine activity. In addition, the perception of the time invested may not correspond with the actual time invested, because the perception depends on how much the person (dis)likes the activity.⁴¹ In several experiments, Soman tests if the sunk cost effect also appears if the investment is done in time. For example, in an experiment half of the subjects was told that by working for fifteen hours as student assistant they have earned a ticket to a theatre performance and by working another five hours they also have earned a ticket to a rock concert. Due to some rescheduling, the events turn out to take place on the same night. The subjects are told that they prefer the rock concert. When asked where they would go, over 95% chose the rock concert. The other half of the subjects was asked the same thing, but here the tickets were bought for €45 and €15 respectively. Now, 62% chose to go to the theatre, even though they preferred the rock concert. The relative weight of the sunk costs was the same: the theatre was three times as ‘expensive’ as the rock concert, but the sunk cost effect was much stronger if the investment was in money.⁴²

A possible explanation is that people do not have the ‘unbalanced mental account’ when it comes to time, because they are not well able to calculate with time. In experiments where the subjects were provided a way to better calculate the time investment (*e.g.* by referring to an hourly wage, or by distinguishing subjects who had previous education about the value of time versus those who did not), the sunk cost effect reappeared. So when subjects had a way to attach money values to the time invested, they responded comparable to how they would have done if the investment was in money rather than time.⁴³

This point is corroborated by research that shows that people who work for an hourly wage tend to make different trade-offs between time and money than those who have a fixed

⁴⁰ R.H. THALER, “Mental Accounting Matters”, *Journal of Behavioral Decision Making*, 1999, 190ff.

⁴¹ D. SOMAN, “The Mental Accounting of Sunk Time Costs: Why Time is not Like Money”, *Journal of Behavioral Decision Making*, 2001, 171, 172.

⁴² *Ibid.*, 173ff.

⁴³ *Ibid.*, 177ff.

contract.⁴⁴ Having experience in calculating time leads to a more economic use of time as a resource. In experiments, people who have experience with hourly wages or with time writing turn out to be willing to trade more time for money than those who have no experience. The possible explanation is that the former group has a clearer idea about the value of their time. The same result is reached when people without an hourly wage first had to calculate their own hourly wage before the experiment started, *e.g.* by dividing their monthly income by the number of worked hours.⁴⁵

This section has shown that in general, people do not treat time and money the same. The sunk cost effect is much weaker, or even absent, in case of time investments. This, in my view, does not imply that people generally do not care about forgone time investments so that loss of time would not have to be included in tort damages. After all, in experiments where subjects were trained or helped in assessing the money value of their time, they behaved comparable to situations where the investment was in money. The different way in which people approach time and money therefore seems to be more a matter of difficulty with accounting with time than of not finding time valuable.

4. A (too?) Simple Estimation of the Non-Pecuniary Value of Time

The previous sections have shown that in principle, non-pecuniary losses should be included in tort damages, but that there is no simple answer to the question what the correct value of time is. This value depends on many circumstances, which are too complicated to include in the calculation of tort damages. The empirical research regarding the value of leisure time and of travel time savings yields widely divergent amounts, which also encompass pecuniary elements. Still, the desire not to systematically exclude non-pecuniary losses from tort damages, combined with the knowledge that accuracy is not required in every individual case, leads me to propose a simple calculation which may shed some light on a possible value of the non-pecuniary value of time.

The basic idea is that losing time will (almost?) never be as serious as losing life, so that the non-pecuniary aspects of ‘the value of life’ provide an upper boundary to any assessment of the non-pecuniary value of time.⁴⁶ In the remainder of this section I will spend attention to several measures which deal with the ‘value of life’. I realize that none of those measures has been developed to express the value of time. I also do not suggest that they do express the value of time, but I do think that, under the assumption that losing life is worse than merely losing time, they can provide relevant information regarding the value of time.

In Section 2.6 it became clear that damages for non-pecuniary losses should be based on the victim’s *ex ante* willingness to pay to avoid the loss. One of the best known examples of a willingness to pay measure (in this case to avoid fatalities) is the *value of a statistical life* (VSL). It is derived from decisions which people take which influence health and safety, such as buying a dangerous product or using safety devices. It shows the implicit trade-off that

⁴⁴ S.E. DEVOE and J. PFEFFER, “When time is money: The effect of hourly payment on the evaluation of time”, *Organizational Behaviour and Human Decision Processes*, 2007, 4.

⁴⁵ *Ibid.*, 8ff.

⁴⁶ Even though the opening quote of Charles Darwin suggests that the value of time may be in close proximity of the value of life, in my view there will almost always be a substantial gap between the two.

people make between money and safety.⁴⁷ The different researches regarding the VSL yield different amounts, but according to Sunstein the VSL is set at about €6 million.⁴⁸

My suggestion is as follows: the VSL is an expression of the value of a (statistical) human life. Assuming a certain life expectancy, it is in principle possible to derive a 'value of a statistical life hour' (VSLH) by dividing the VSL by the number of hours in the average life expectancy. For example, the average life expectancy in the Netherlands is about 80 years,⁴⁹ hence 701,280 hours. Using an average VSL of €6 million, this would result in a VSLH of €8.55. Given that the VSL regards the value of *life*, the VSLH relates to, simply put, living one hour. The topic of this paper, loss of time, deals with *e.g.* having to wait at the airport or having to spend time at trial. This implies that the VSLH will often be higher than the value of the lost time. For many situations, the relevant value will be (much) lower.

Obviously, there are some problems attached to this simple calculation. One of these is the fact that the VSL consists of both pecuniary and non-pecuniary elements, while this paper deals only with the non-pecuniary aspect of loss of time. According to Miller, about 50 to 75% of the VSL consists of immaterial losses.⁵⁰ This would imply that the non-pecuniary part of the VSLH would be about €4.25 to €6.40.

Another issue may be that the value of time may depend on age and that in calculating back from a full life to an hour, issues such as discounting become relevant. In the VSL-literature, both possible age differences as well as discounting issues are incorporated by assessing the *value of a statistical life year* (VSLY) rather than a VSL. The VSLY is based on the VSL and is assessed by incorporating a discount factor and information on the age of the subjects in the VSL research. Sunstein mentions amounts of the VSLY of about €167,500 for people under the age of 65, and €266,500 for people above that age. This would result in a non-pecuniary part of the VSLH of about €9.53 to €14.29 for younger people and €15.20 to €22.80 for older people.

Yet another approach may be to use the *Quality Adjusted Life Year* (QALY) as a method to assess the upper limit of non-pecuniary damages for loss of time.⁵¹ This measure expresses the quality of life in a number between 1.0 (perfect health) and 0.0 (death). An advantage of this method is that QALYs express the impact of health related issues (such as injuries and illnesses) on the quality of life, so that they focus on non-pecuniary aspects. In addition, this method is able to cover shorter periods of time. Recent European research found an average overall mean amount estimated over ten European countries of €65,500 per QALY.⁵² Calculating this back to hours would result in an amount of €7.47.

In my view, this last method is the most reliable. As said, QALYs only encompass non-pecuniary aspects, which avoids having to work with Miller's range of 50-75%. Also the fact that they are able to cover shorter periods of time makes them better applicable than calculating back from a statistical life (in which assumptions regarding life expectancy are necessary) or a statistical life year. Given the fact that a full QALY expresses the value of life and that losing time (almost) always will be less severe than losing life, the amount of €7.47 again reflects an upper boundary of the non-pecuniary aspect of loss of time. Different than

⁴⁷ See *e.g.* W.K. VISCUSI and J.E. ALDY, "The Value of a Statistical Life: A Critical Review of Market Estimates throughout the World", *The Journal of Risk and Uncertainty*, 2003, 5-76.

⁴⁸ C.R. SUNSTEIN, "Lives, Life-Years, and Willingness to Pay", *Columbia Law Review*, 2004, 205.

⁴⁹ www.indexmundi.com/nl/nederland/levensverwachting.html.

⁵⁰ T.R. MILLER, "Willingness to Pay Comes of Age: Will the System Survive?", *Northwestern University Law Review*, 1989, 893, 894.

⁵¹ For an overview of what QALYs are, see *e.g.* V. KARAPANOU and L.T. VISSCHER, "Towards a Better Assessment of Pain and Suffering Damages", *Journal of European Tort Law*, 2010, 48-74.

⁵² C. DONALDSON *et al.*, *European Value of a Quality Adjusted Life Year- Final Report*, 2011, 72, 74. [Http://research.ncl.ac.uk/eurovaq/EuroVaQ_Final_Publishable_Report_and_Appendices.pdf](http://research.ncl.ac.uk/eurovaq/EuroVaQ_Final_Publishable_Report_and_Appendices.pdf).

with VSL and VSLY, though, QALYs enable a more exact assessment of the value of time than merely indicating the upper boundary.

A method to assess QALY weights of different health related situations which is generally regarded as one of the better methods is the *Health Utilities Index Mark 3 (HUI3)*.⁵³ This method distinguishes between various physical factors (such as vision, hearing, speech, ambulation, and pain), but also mentions ‘emotion’ as a separate category. Given that a mere loss of time does not involve physical injuries, one could argue that only this latter category is relevant. After all, one could say that during the time that someone is forced to be engaged in other activities than the preferred ones, the level of happiness of the victim is lowered. The possible levels of emotion in the HUI3 are ‘happy and interested in life’, ‘somewhat happy’, ‘somewhat unhappy’, ‘very unhappy’ and ‘so unhappy that life is not worthwhile’. In my view the last category is too severe to express the impact of a mere loss of time, but the third and fourth (so ‘somewhat unhappy’ or ‘very unhappy’) may be a good way to express the fact that during the loss of time, the victim yielded no (or at least lower) utility.

The exact impact of a decrease in the level of happiness on the overall QALY level depends on how high the levels of health and happiness of the victim were before the loss of time. In the HUI3, the total QALY level is determined by a formula in which all distinguished health and happiness factors play a role. If our victim was otherwise healthy and happy, a decrease in happiness level to ‘somewhat unhappy’ respectively ‘very unhappy’ would result in a decrease in QALY level of about 0.21 to 0.49.⁵⁴ Assuming the abovementioned value of €7.47 per hour which is based on a full QALY, the immaterial value due to loss of time could then be assessed at €1.54 to €3.69.

I therefore propose to set damages for the non-pecuniary loss due to a loss of time at an amount between €1.50 and €3.50 per hour, with an average of €2.50 per hour. This would result in an amount of €60 per full day.

5. Conclusion

In this paper I have argued that non-pecuniary losses should be included in tort damages, and that they should be based on the idea of ex ante compensation: how many resources would the victim have been willing to spend in order to avoid the losses? In searching for the willingness to pay to avoid loss of time, I first have discussed economic research regarding the value of time. Theoretical research showed that the value of time depends on a lot of factors, which are not readily available in a tort case. Empirical research resulted in amounts

⁵³ J. BRAZIER, M. DEVERILL, C. GREEN, R. HARPER and A. BOOTH, “A review of the use of health status measures in economic evaluation”, *Health Technology Assessment*, 1999, 76.

⁵⁴ See D. FEENY et al., “Multiattribute and Single-Attribute Utility Functions for the Health Utilities Index Mark 3 System”, *Medical Care*, 2002, 124. The formula reads $u^* = 1.371 * b1 * b2 * b3 * b4 * b5 * b6 * b7 * b8 - 0.371$. In this formula, u^* is the utility level of the individual under consideration, $b1$ relates to vision, $b2$ to hearing, $b3$ to speech, $b4$ to ambulation, $b5$ to dexterity, $b6$ to emotion, $b7$ to cognition and $b8$ to pain. Each factor consists of five or six levels in which the health level of the individual concerned is expressed. The lower the health level, the lower the value of the factor in the formula will be. Regarding the factor ‘emotion’, the five levels are already mentioned in the main text above. The connected values of factor $b6$ in the formula are 1.0 (happy and interested in life), 0.95 (somewhat happy), 0.85 (somewhat unhappy), 0.64 (very unhappy) and 0.46 (so unhappy that life is not worthwhile). Assuming an otherwise healthy and happy person implies that factors $b1$ to $b8$ all had a score of 1.0, which implies that the outcome of the formula is $1.371 * 1 * 1 * 1 * 1 * 1 * 1 * 1 * 1 - 0.371 = 1.371 - 0.371 = 1.0$. As explained above, a QALY value of 1.0 means that the person is healthy. If the level of happiness due to the loss of time would decrease to ‘somewhat unhappy’, keeping all other factors constant at 1.0, the outcome of the formula would be $1.371 * 1 * 1 * 1 * 1 * 1 * 0.85 * 1 * 1 - 0.371 = 0.79435$. The QALY loss would hence be $1.0 - 0.79435 = 0.20565$. The outcome of the formula in case of a decrease to ‘very unhappy’ would be $1.371 * 1 * 1 * 1 * 1 * 1 * 0.64 * 1 * 1 - 0.371 = 0.87744 - 0.371 = 0.50644$. The QALY loss would then be 0.49356.

that diverge a lot and that encompass both pecuniary and non-pecuniary aspects. Under the assumption that loss of life is more serious than loss of time, I have argued that research regarding the value of life may provide valuable information regarding the upper limit of the value of time. In my view, the concept of the Quality Adjusted Life Year is the best measure for the topic of this paper, given that a QALY only relates to non-pecuniary aspects and is also suitable for shorter periods of time. A good way to assess the value of loss of time is by investigating the impact of a decrease in the level of happiness on the QALY level of an otherwise happy and healthy victim. Such an analysis results in damages for the non-pecuniary loss due to a loss of time of €1.50 to €3.50 per hour, with an average of €2.50 per hour.